Nanostructure Electrochemical Sensor for Voltammetric Determination of Vitamin C in the Presence of Vitamin B₆: Application to Real Sample Analysis

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A carbon paste electrode modified by using ZnO/CuO nanosheets, ionic liquids (N-hexyl-3-methylimidazolium hexafluoro phosphate) and 2-(ferrocenylethynyl)fluoren-9-one was fabricated and used for electrocatalytic oxidation of vitamin C. It has been found that, the oxidation of vitamin C at the surface of such an electrode occurs at a potential about 190 mV less positive compared to an unmodified carbon paste electrode. The oxidation peak currents show a linear dependence on the vitamin C concentrations in the range of 4.0×10^{-8} M– 1.0×10^{-3} M with a detection limit of 2.0×10^{-8} M. The diffusion coefficient ($D/\text{cm}^2 \text{ s}^{-1} = 5.38 \times 10^{-6}$), electron transfer coefficient, ($\alpha = 0.28$) and the heterogeneous rate constant, ($k/\text{M}^{-1} \text{ s}^{-1} = 2.3 \times 10^3$) for vitamin C were determined using electrochemical approaches. The modified electrode exhibits good resolution between the voltammetric peaks of vitamin C and vitamin B₆ that makes it suitable for the detection of vitamin C in the presence of vitamin B₆ in real samples.

Keywords: Vitamin C, Vitamin B₆, ZnO/CuO nanosheets, Ionic liquid, Food analysis

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